Institutes of Health. The NCBI web site, from which access to the database may be sought, www.ncbi.nlm.nih.gov/. The allergens may be used as described above in order to identify MHC-restricted peptides capable of inducing LPR in individuals who possess a particular MHC molecule.

Allergen sequences and database accession numbers (NCBI Entrez accession numbers):

House dust mite

Dermatophagoides pteronyssinus

Der p 1 (SEQ ID NO: 19)

MKIVLAIASLLALSAVYARPSSIKTFEEYKKAFNKSYATFEDEEAAR
KNFLESVKYVQSNGGAINHLSDLSLDEFKNRFLMSAEAFEHLKTQF
DLNAETNACSINGNAPAEIDLRQMRTVTPIRMQGGCGSCWAFSGV
AATESAYLAYRNQSLDLAEQELVDCASQHGCHGDTIPRGIEYIQHN
GVVQESYYRYVAREQSCRRPNAQRFGISNYCQIYPPNVNKIREALA
QTHSAIAVIIGIKDLDAFRHYDGRTIIQRDNGYQPNYHAVNIVGYSN
AQGVDYWIVRNSWDTNWGDNGYGYFAANIDLMMIEEYPYVVIL

Der p 2 (SEQ ID NO: 20)

MMYKILCLSLLVAAVARDQVDVKDCANHEIKKVLVPGCHGSEPCII
HRGKPFQLEAVFEANQNTKTAKIEIKASIDGLEVDVPGIDPNACHY
MKCPLVKGQQYDIKYTWNVPKIAPKSENVVVTVKVMGDDGVLAC
AIATEIAEIDS

Der p 3 (SEQ ID NO: 21)

MIIYNIIIVLLLAINTLANPILPASPNATIVGGEKAIAGECPYQISLQS
SSIIFCGGTIIDEYWIITAAHCVAGQTASKLSIRYNSLKHSIGGEKIS

VAKIFAHEKYDSYQIDNDIALIKLKSPMKLNQKNAKAVGLPAKGSD
VKVGDQVRVSGWGYLEEGSYSLPSELRRVDIAVVSRKECNELYSKA
NAEVTDNMICGGDVANGGKDSCQGDSGGPVVDVKNNQVVGIVSW
GYGCARKGYPGVYTRVGNFIDWIESKRSQ

Der p 4 (SEQ ID NO: 22)
KYXNPHFIGXRSVITXLME

Der p 5 (SEQ ID NO: 23)
MKFIIAFFVATLAVMTVSGEDKKHDYQNEFDFLLMERIHEQIKKGE
LALFYLQEQINHFEEKPTKEMKDKIVAEMDTIIAMIDGVRGVLDRL
MQRKDLDIFEQYNLEMAKKSGDILERDLKKEEARVKKIEV

Der p 6 (SEQ ID NO: 24)
AIGXQPAAEAEAPFQISLMK

Der p 7 (SEQ ID NO: 25)
MMKLLLIAAAAFVAVSADPIHYDKITEEINKAVDEAVAAIEKSETFD
PMKVPDHSDKFERHIGIIDLKGELDMRNIQVRGLKQMKRVGDANV
KSEDGVVKAHLLVGVHDDVVSMEYDLAYKLGDLHPNTHVISDIQD
FVVELSLEVSEEGNMTLTSFEVRQFANVVNHIGGLSILDPIFAVLSD
VLTAIFQDTVRAEMTKVLAPAFKKELERNNQ

Der p9 (SEQ ID NO: 26)
IVGGSNASPGDAVYQIAL

Dermatophagoides farinae

[illegible] (SEQ ID NO: [illegible])
MKFVLALASLLVLLVYARPASIKTFEEKKAFNKNYATVEEEEVARK

NFLESLKYVEANKGAINHLSDLSLDEFKNRYLMSAEAFEQLKTQFD
LNAETSACRINSVNVPSELDLRSLRTVTPIRMQGGCGSCWAFSGVA
ATESAYLAYRNTSLDLSEQELVDCASQHGCHGDTIPRGIEYIQQNG
VVEERSYPYVAREQRCRRPNSQHYGISNYCQIYPPDVKQIREALTQT
HTAIAVIIGIKDLRAFQHYDGRTIIQHDNGYQPNYHAVNIVGYGSTQ
GDDYWIVRNSWDTTWGDSGYGYFQAGNNLMMIEQYPYVVIM

Der f 2 (SEQ ID NO: 28)
MISKILCLSLLVAAVVADQVDVKDCANNEIKKVMVDGCHGSDPCI
HRGKPFTLEALFDANQNTKTAKIEIKASLDGLEIDVPGIDTNACHFM
KCPLVKGQQYDIKYTWNVPKIAPKSENVVVTVKLIGDNGVLACAIA
THGKIRD

Der f 3 (SEQ ID NO: 29)
MMILTIVVLLAANILATPILPSSPNATIVGGVKAQAGDCPYQISLQSS
SHFCGGSILDEYWILTAAHCVNGQSAKKLSIRYNTLKHASGGEKIQV
AEIYQHENYDSMTIDNDVALIKLKTPMTLDQTNAKPVPLPAQGSDV
KVGDKIRVSGWGYLQEGSYSLPSELQRVDIDVVSREQCDQLYSKAG
ADVSENMICGGDVANGGVDSCQGDSGGPVVDVATKQIVGIVSWGY
GCARKGYPGVYTRVGNFVDWIESKRSQ

Der f 4 (SEQ ID NO: 30)
AVGGQDADLAEAPFQISLLK

Der f 7 (SEQ ID NO: 31)
MMKFLLIAAVAFVAVSADPIHYDKITEEINKAIDDAIAAIEQSETIDP
MKVPDHADKFFRHVGIVDEKGELAMRNIEARGLKQMKRQGDANV
[illegible]
VALSLEISDEGNLMLSEEVRQFANVVNHIGGLSLDPIEGVLSDVL
LAIFQDLVRKFMLKVLAPAFKRELEKN

Additional mite allergen sequences (NCBI entrez accession):

1170095; 1359436; 2440053; 666007; 487661; 1545803; 84702; 84699; 625532; 404370; 1091577; 1460058; 7413; 9072; 387592.

Cat

Felis sequences

1082946 Fel dI chain 2 precursor – cat (SEQ ID NO: 32)
MRGALLVLALLVTQALGVKMAETCPIFYDVFFAVANGNELLLDLS
LTKVNATEPERTAMKKIQDCYVENGLISRVLDGLVMTTISSSKDCM
GEAVQNTVEDLKLNTLGR

1082945 Fel dI chain 1 short form – cat (SEQ ID NO: 33)
MLDAALPPCPTVAATADCEICPAVKRDVDLFLTGTPDEYVEQVAQ
YKALPVVLENARILKNCVDAKMTEEDKENALSLLDKIYTSPLC

1082944 Fel dI chain 1 long form precursor – cat (SEQ ID NO: 34)

MKGARVLVLLWAALLLIWGGNCEICPAVKRDVDLFLTGTPDEYVE
QVAQYKALPVVLENARILKNCVDAKMTEEDKENALSLLDKIYTSPL
C

Additional Felis sequences (NCBI entrez accession):

539716; 539715; 423193; 423192; 423191; 423190; 1364213; 1364212; 395407; 163827; 163823; 163825; 1169665; 232086; 1169666.

Latex

Hevea sequences

Hev b 1 (SEQ ID NO: 35)

MAEDEDNQQGQGEGLKYLGFVQDAATYAVTTFSNVYLFAKDKSG
PLQPGVDIIEGPVKNVAVPLYNRFSYIPNGALKFVDSTVVASVTIIDR
SLPPIVKDASIQVVSAIRAAPEAARSLASSLPGQTKILAKVFYGEN

Hev b 3 (SEQ ID NO: 36)

MAEEVEEERLKYLDFVRAAGVYAVDSFSTLYLYAKDISGPLKPGV
DTIENVVKTVVTPVYYIPLEAVKFVDKTVDVSVTSLDGVVPPVIKQ
VSAQTYSVAQDAPRIVLDVASSVFNTGVQEGAKALYANLEPKAEQ
YAVITWRALNKLPLVPQVANVVVPTAVYFSEKYNDVVRGTTEQGY
RVSSYLPLLPTEKITKVFGDEAS

Additional Hevea sequences (NCBI entrez accession):
3319923; 3319921; 3087805; 1493836; 1480457; 1223884; 3452147;
3451147; 1916805; 232267; 123335; 2501578; 3319662; 3288200;
1942537; 2392631; 2392630; 1421554; 1311006; 494093; 3183706; 3172534;
283243; 1170248; 1708278; 1706547; 464775; 266892;
231586; 123337; 116359; 123062; 2213877; 542013; 2144920; 1070656;
2129914; 2129913; 2129912; 100135; 82026; 1076559; 82028; 82027;
282933; 280399; 100138; 1086972; 108697; 1086976; 1086978;
1086978; 1086976; 1086974; 1086972; 913758; 913757; 913756;
234388; 1092500; 228691; 1177405; 18839; 18837; 18835; 18833;
18831; 1209317; 1184668; 168217; 168215; 168213; 168211; 168209;
348137.

Rye grass

126385 Lol p 1 (SEQ ID NO: 37)

MASSSSVLLVVALFAVFLGSAHGIAKVPPGPNITAEYGDKWLDAKS
TWYGKPTGAGPKDNGGACGYKNVDKAPFNGMTGCGNTPIFKDGR
GCGSCFEIKCTKPESCSGEAVTVTITDDNEEPIAPYHFDLSGHAFGS
MAKKGEEQNVRSAGELELQFRRVKCKYPDDTKPTFHVEKASNPNY
LAILVKYVDGDGDVVAVDIKEKGKDKWIELKESWGAVWRIDTPDK
LTGPFTVRYTTEGGTKSEFEDVIPEGWKADTSYSAK

126386 Lol p 2a (SEQ ID NO: 38)
AAPVEFTVEKGSDEKNLALSIKYNKEGDSMAEVELKEHGSNEWLA
LKKNGDGVWEIKSDKPLKGPFNFRFVSEKGMRNVFDDVVPADFKV
GTTYKPE

126387 Lol p 3 (SEQ ID NO: 39)
TKVDLTVEKGSDAKTLVLNIKYTRPGDTLAEVELRQHGSEEWEPM
TKKGNLWEVKSAKPLTGPMNFRFLSKGGMKNVFDEVIPTAFTVGK
TYTPEYN

2498581 Lol p 5a (SEQ ID NO: 40)
MAVQKYTVALFLRRGPRGGPGRSYAADAGYTPAAAATPATPAATP
AGGWREGDDRRAEAAGGRQRLASRQPWPPLPTPLRRTSSRSSRPPS
PSPPRASSPTSAAKAPGLIPKLDTAYDVAYKAAEAHPRGQVRRLRH
CPHRSLRVIAGALEVHAVKPATEEVLAAKIPTGELQIVDKIDAAFKI
AATAANAAPTNDKFTVFESAFNKALNECTGGAMRPTSSSPPSRPRS
SRPTPPPSPAAPEVKYAVFEAALTKAITAMTQAQKAGKPAAAAATA
AATVATAAATAAAVLPPPLLVVQSLISLLIYY

2498582 Lol p 5b (SEQ ID NO: 41)

ATPATPATPATPAAVPSGKATTEEQKTIEKTNAGEKAAVAAAAAVVP
PADKYKTFVETFGTATNKAFVEGLASGYADQSKNQLTSKLDAALK

LAYEAAQGATPEAKYDAYVATLTEALRVIAGTLEVHAVKPAAEEV
KVGAIPAAEVQLIDKVDAAYRTAATAANAAPANDKFTVFENTFNN
AIKVSLGAAYDSYKFIPTLVAAVKQAYAAKQATAPEVKYTVSETAL
KKAVTAMSEAEKEATPAAAATATPTPAAATATATPAAAYATATPA
AATATATPAAATATPAAAGGYKV

455288 Lol p isoform 9 (SEQ ID NO: 42)

MAVQKHTVALFLAVALVAGPAASYAADAGYAPATPATPAAPATA
ATPATPATPATPAAVPSGKATTEEQKLIEKINAGFKAAVAAAAVVP
PADKYKTFVETFGTATNKAFVEGLASGYADQSKNQLTSKLDAALK
LAYEAAQGATPEAKYDAYVATLTEALRVIAGTLEVHAVKPAAEEV
KVGAIPAAEVQLIDKVDAAYRTAATAANAAPANDKFTVFENTFNN
AIKVSLGAAYDSYKFIPTLVAAVKQAYAAKQATAPEVKYTVSETAL
KKAVTAMSEAEKEATPAAAATATPTPAAATATATPAAAYATATPA
AATATATPAAATATPAAAGGYKV

1582249 Lol p 11 (SEQ ID NO: 43)

DKGPGFVVTGRVYCDPCRAGFETNVSHNVEGATVAVDCRPFDGG
ESKLKAEATTDKDGWYKIEIDQDHQEEICEVVLAKSPDKSCSEIEEF
RDRARVPLTSNXGIKQQGIRYANPIAFFRKEPLKECGGILQAY

Additional Lolium sequences (NCBI entrez accession):

135480; 417103; 687261; 687259; 1771355; 2388662; 631955; 542131; 542130; 542129; 100636; 626029; 542132; 320616; 320615; 320614; 100638; 100634; 82450; 626028; 100639; 283345; 542133; 1771353; 1763163; 1040877; 1040875; 250525; 551047; 515377; 510911; 939932;

Olive tree

Olive sequences

416610 Ole e 1 (SEQ ID NO: 44)

EDIPQPPVSQFHIQGQVYCDTCRAGFITELSEFIPGASLRLQCKDKEN

GDVTFTEVGYTRAEGLYSMLVE

RDHKNEFCEITLISSGRKDCNEIPTEGWAKPSLKFKLNTVNGTTRTV

NPLGFFKKEALPKCAQVYNKLGM

YPPNM

Parietaria

Parietaria sequences:

2497750 Par j P2 (SEQ ID NO: 45)

MRTVSMAALVVIAAALAWTSSAEPAPAPAPGEEACGKVVQDIMPC

LHFVKGEEKEPSKECCSGTKKLSEEVKTTEQKREACKCIVRATKGIS

GIKNELVAEVPKKCDIKTTLPPITADFDCSKIQSTIFRGYY

1352506 Par j P5 (SEQ ID NO: 46)

MVRALMPCLPFVQGKEKEPSKGCCSGAKRLDGETKTGPQRVHACE

CIQTAMKTYSDIDGKLVSEVPKHCGIVDSKLPPIDVNMDCKTVGVV

PRQPQLPVSLRHGPVTGPSDPAHKARLERPQIRVPPPAPEKA

1532056 Par j P8 (SEQ ID NO: 47)

MRTVSMAALVVIAAALAWTSSAELASAPAPGEGPCGKVVHHIMPC

I KFVKGEEKEPSKSCCSGTKKLSEEVKTTEQKREACKCIVAATKGIS

GIKNELVALVPKKCDIKTTLPPITADFDCSKIQSTIFRGYY

[illegible] Par j P9 (SEQ ID NO: 48)

MRTVSAPSAVALVVIVAAGLAWTSLASVAPPAPAPGSEETCGTVVR

ALMPCLPFVQGKEKEPSKGCCSGAKRLDGETKTGLQRVHACECIQT
AMKTYSDIDGKLVSEVPKHCGIVDSKLPPIDVNMDCKTLGVVPRQP
QLPVSLRHGPVTGPSDPAHKARLERPQIRVPPPAPEKA

2497749 Par j P9 (SEQ ID NO: 49)

MRTVSARSSVALVVIVAAVLVWTSSASVAPAPAPGSEETCGTVVGA
LMPCLPFVQGKEKEPSKGCCSGAKRLDGETKTGPQRVHACECIQTA
MKTYSDIDGKLVSEVPKHCGIVDSKLPPIDVNMDCKTLGVLHYKG
N

1086003 Par j 1 (SEQ ID NO: 50)

MVRALMPCLPFVQGKEKEPSKGCCSGAKRLDGETKTGPQRVHACE
CIQTAMKTYSDIDGKLVSEVPKHCGIVDSKLPPIDVNMDCKTVGVV
PRQPQLPVSLRHGPVTGPSRSRPPTKHGWRDPRLEFRPPHRKKPNP
AFSTLG

Additional Parietaria sequences (NCBI entrez accession):

543659; 1836011; 1836010; 1311513; 1311512; 1311511; 1311510; 1311509; 240971.

Timothy grass

Phleum sequences:

Phl p 1 (SEQ ID NO: 51)

MASSSSVLLVVVLFAVFLGSAYGIPKVPPGPNITATYGDKWLDAKS
TWYGKPTGAGPKDNGGACGYKDVDKPPFSGMTGCGNTPIFKSGRG
CGSCFEIKCTKPEVCSGLPVVVHITDDNEEPIAPYHFDLSGHAFGAM
AKPGDEQKLRSAGVLEMQFRRVKCKYPEGTKVTFHVEKGSNPN
YLAVLVKYVNGDGDVVAVDIKEKGKDKWIELKESWGAIWRIDTPDKL

TGPFTVRYTTEGGTKTEAEDVIPEGWKADTSYESK

Phl p 1 (SEQ ID NO: 52)

MASSSSVLLVVALFAVFLGSAHGIPKVPPGPNITATYGDKWLDAKS
TWYGKPTAAGPKDNGGACGYKDVDKPPFSGMTGCGNTPIFKSGRG
CGSCFEIKCTKPEACSGEPVVVHITDDNEEPIAAYHFDLSGIAFGSM
AKKGDEQKLRSAGEVEIQFRRVKCKYPEGTKVTFHVEKGSNPNYL
ALLVKFSGDGDVVAVDIKEKGKDKWIALKESWGAIWRIDTPEVLK
GPFTVRYTTEGGTKARAKDVIPEGWKADTAYESK

Phlp 2 (SEQ ID NO: 53)

MSMASSSSSSLLAMAVLAALFAGAWCVPKVTFTVEKGSNEKHLAV
LVKYEGDTMAEVELREHGSDEWVAMTKGEGGVWTFDSEEPLQGP
FNFRFLTEKGMKNVFDDVVPEKYTIGATYAPEE

Phl p 5 (SEQ ID NO: 54)

ADLGYGGPATPAAPAEAAPAGKATTEEQKLIEKINDGFKAALAAA
AGVPPADKYKTFVATFGAASNKAFAEGLSAEPKGAAESSSKAALTS
KLDAAYKLAYKTAEGATPEAKYDAYVATLSEALRIIAGTLEVHAV
KPAAEEVKVIPAGELQVIEKVDSAFKVAATAANAAPANDKFTVFEA
AFNNAIKASTGGAYESYKFIPALEAAVKQAYAATVATAPEVKYTVF
ETALKKAFTAMSEAQKAAKPATEATATATAAVGAATGAATAATG
GYKV

Phl p 5 (SEQ ID NO: 55)

ADLGYGGPATPAAPAEAAPAGKATTEEQKLIEKINDGFKAALAAA
AGVPPADKYKTFVATFGAASNKAFAEGLSAEPKGAAESSSKAALTS
[illegible]
KPAAEEVKVIPAGELQVIEKVDSAFKVAATAANAAPANDKFTVFEA
AFNNAIKASTGGAYESYKFIPALEAAVKQAYAATVATAPEVKYTVF

ETALKKAITAMSEAQKAAKPATEATATATAAVGAATGAATAATGG
YKV

Phl p 5b (SEQ ID NO: 56)

AAAAVPRRGPRGGPGRSYTADAGYAPATPAAAGAAAGKATTEEQ
KLIEDINVGFKAAVAAAASVPAADKFKTFEAAFTSSSKAAAAKAPG
LVPKLDAAYSVAYKAAVGATPEAKFDSFVASLTEALRVIAGALEV
HAVKPVTEEPGMAKIPAGELQIIDKIDAAFKVAATAAATAPADDKF
TVFEAAFNKAIKESTGGAYDTYKCIPSLEAAVKQAYAATVAAAPQV
KYAVFEAALTKAITAMSEVQKVSQPATGAATVAAGAATTAAGAAS
GAATVAAGGYKV

Phl p 5a (SEQ ID NO: 57)

ADLGYGPATPAAPAAGYTPATPAAPAGADAAGKATTEEQKLIEKIN
AGFKAALAGAGVQPADKYRTFVATFGPASNKAFAEGLSGEPKGAA
ESSSKAALTSKLDAAYKLAYKTAEGATPEAKYDAYVATLSEALRII
AGTLEVHAVKPAAEEVKVIPAGELQVIEKVDAAFKVAATAANAAP
ANDKFTVFEAAFNDEIKASTGGAYESYKFIPALEAAVKQAYAATVA
TAPEVKYTVFETALKKAITAMSEAQKAAKPAAAATATATAAVGAA
TGAATAATGGYKV

Phl p 5 (SEQ ID NO: 58)

MAVQKYTVALFLAVALVAGPAASYAADAGYAPATPAAAGAEAGK
ATTEEQKLIEDINVGFKAAVAAAASVPAADKFKTFEAAFTSSSKAA
TAKAPGLVPKLDAAYSVSYKAAVGATPEAKFDSFVASLTEALRVIA
GALEVHAVKPVTEEPGMAKIPAGELQIIDKIDAAFKVAATAAATAP

AASGAATVAAGGYKV

Phl p 5 (SEQ ID NO: 59)

MAVQKYTVALFLAVALVAGPAASYAADAGYAPATPAAAGAEAGK
ATTEEQKLIEDINVGFKAAVAAAASVPAADKFKTFEAAFTSSSKAA
TAKAPGLVPKLDAAYSVAYKAAVGATPEAKFDSFVASLTEALRVIA
GALEVHAVKPVTEDPAWPKIPAGELQIIDKIDAAFKVAATAAATAP
ADDKFTVFEAAFNKAIKESTGGAYDTYKCIPSLEAAVKQAYAATV
AAAPQVKYAVFEAALTKAITAMSEVQKVSQPATGAATVAAGAATT
ATGAASGAATVAAGGYKV

Phl p 5 (SEQ ID NO: 60)

ADAGYAPATPAAAGAEAGKATTEEQKLIEDINVGFKAAVAAAASV
PAADKFKTFEAAFTSSSKAATAKAPGLVPKLDAAYSVAYKAAVGA
TPEAKFDSFVASLTEALRVIAGALEVHAVKPVTEEPGMAKIPAGEL
QIIDKIDAAFKVAATAAATAPADDKFTVFEAAFNKAIKESTGGAYD
TYKCIPSLEAAVKQAYAATVAAAPQVKYAVFEAALTKAITAMSEV
QKVSQPATGAATVAAGAATTAAGAASGAATVAAGGYKV

Phl p 5 (SEQ ID NO: 61)

SVKRSNGSAEVHRGAVPRRGPRGGPGRSYAADAGYAPATPAAAGA
EAGKATTEEQKLIEDINVGFKAAVAAAASVPAADKFKTFEAAFTSS
SKAATAKAPGLVPKLDAAYSVAYKAAVGATPEAKFDSFVASLTEA
LRVIAGALEVHAVKPVTEEPGMAKIPAGELQIIDKIDAAFKVAATAA
ATAPADDKFTVFEAAFNKAIKESTGGAYDTYKCIPSLEAAVKQAYA
ATVAAAPQVKYAVFEAALTKAITAMSEVQKVSQPATGAATVAAGA
ATTAAGAASGAATVAAGGYKV

ATPAAPAGAEPAGKATTEEQKLIEKINAGFKAALAAAAGVPPADKY
RTFVATFGAASNKAFAEGLSGEPKGAAESSSKAALTSKLDAAYKLA

YKTAEGATPEAKYDAYVATVSEALRIIAGTLEVHAVKPAAEEVKVI
PAGELQVIEKVDAAFKVAATAANAAPANDKFTVFEAAFNDAIKAS
TGGAYESYKFIPALEAAVKQAYAATVATAPEVKYTVFETALKKAIT
AMSEAQKAAKPAAAATATATAAVGAATGAATAATGGYKV

Phl p 5 (SEQ ID NO: 63)

ADLGYGGPATPAAPAEAAPAGKATTEEQKLIEKINDGFKAALAAA
AGVPPADKYKTFVATFGAASNKAFAEGLSAEPKGAAESSSKAALTS
KLDAAYKLAYKTAEGATPEAKYDAYVATLSEALRIIAGTLEVHAV
KPAAEEVKVIPAGELQVIEKVDSAFKVAATAANAAPANDKFTVFEA
AFNNAIKASTGGAYESYKFIPALEAAVKQAYAATVATAPEVKYTVF
ETALKKAFTAMSEAQKAAKPATEATATATAAVGAATGAATAATG
GYKV

Phl p5b (SEQ ID NO: 64)

AAAAVPRRGPRGGPGRSYTADAGYAPATPAAAGAAAGKATTEEQ
KLIEDINVGFKAAVAAAASVPAADKFKTFEAAFTSSSKAAAAKAPG
LVPKLDAAYSVAYKAAVGATPEAKFDSFVASLTEALRVIAGALEV
HAVKPVTEEPGMAKIPAGELQIIDKIDAAFKVAATAAATAPADDKF
TVFEAAFNKAIKESTGGAYDTYKCIPSLEAAVKQAYAATVAAAPQV
KYAVFEAALTKAITAMSEVQKVSQPATGAATVAAGAATTAAGAAS
GAATVAAGGYKV

Phl p5a (SEQ ID NO: 65)

ADLGYGPATPAAPAAGYTPATPAAPAGADAAGKATTEEQKLIEKIN
AGFKAALAGAGVQPADKYRTFVATFGPASNKAFAEGLSGEPKGAA

ANDKFTVFEAAFNDEIKASTGGAYESYKFIPALEAAVKQAYAATVA
TAPEVKYTVFETALKKAITAMSEAQKAAKPAAAATATATAAVGAA

TGAATAATGGYKV

Phl p 5 (SEQ ID NO: 66)

AVPRRGPRGGPGRSYAADAGYAPATPAAAGAEAGKATTEEQKLIE
DINVGFKAAVAAAASVPAGDKFKTFEAAFTSSSKAATAKAPGLVPK
LDAAYSVAYKAAVGATPEAKFDSFVASLTEALRVIAGALEVHAVK
PVTEEPGMAKIPAGELQIIDKIDAAFKVAATAAATAPADDKFTVFE
AAFNKAIKESTGGAYDTYKCIPSLEAAVKQAYAATVAAAPQVKYA
VFEAALTKAITAMSEVQKVSQPATGAATVAAGAATTATGAASGAA
TVAAGGYKV

Phl p 5b (SEQ ID NO: 67)

MAVPRRGPRGGPGRSYTADAGYAPATPAAAGAAAGKATTEEQKLI
EDINVGFKAAVAARQRPAADKFKTFEAASPRHPRPLRQGAGLVPKL
DAAYSVAYKAAVGATPEAKFDSFVASLTEALRVIAGALEVHAVKP
VTEEPGMAKIPAGELQIIDKIDAAFKVAATAAATAPADDKFTVFEA
AFNKAIKESTGGAYDTYKCIPSLEAAVKQAYAATVAAAAEVKYAV
FEAALTKAITAMSEVQKVSQPATGAATVAAGAATTAAGAASGAAT
VAAGGYKV

Phl p 5 (SEQ ID NO: 68)

MAVHQYTVALFLAVALVAGPAASYAADLGYGPATPAAPAAGYTP
ATPAAPAEAAPAGKATTEEQKLIEKINAGFKAALAAAAGVQPADK
YRTFVATFGAASNKAFAEGLSGEPKGAAESSSKAALTSKLDAAYKL
AYKTAEGATPEAKYDAYVATLSEALRIIAGTLEVHAVKPAAEEVKV
IPAGELQVIEKVDAAFKVAATAANAAPANDKFTVFEAAFNDAIKAS

Phl p 5 (SEQ ID NO: 69)

EAPAGKATTEEQKLIEKINAGFKAALARRLQPADKYRTFVATFGPA
SNKAFAEGLSGEPKGAAESSSKAALTSKLDAAYKLAYKTAEGATPE
AKYDAYVATLSEALRIIAGTLEVHAVKPAAEEVKVIPAAELQVIEKV
DAAFKVAATAANAAPANDKFTVFEAAFNDEIKASTGGAYESYKFIP
ALEAAVKQAYAATVATAPEVKYTVFETALKKAITAMSEAQKAAKP
PPLPPPPQPPPLAATGAATAATGGYKV

Phl p 5 (SEQ ID NO: 70)

MAVHQYTVALFLAVALVAGPAASYAADLGYGPATPAAPAAGYTP
ATPAAPAEAAPAGKATTEEQKLIEKINAGFKAALAAAAGVQPADK
YRTFVATFGAASNKAFAEGLSGEPKGAAESSSKAALTSKLDAAYKL
AYKTAEGATPEAKYDAYVATLSEALRIIAGTLEVHAVKPAAEEVKV
IPAGELQVIEKVDAAFKVAATAANAAPANDKFTVFEAAFNDAIKAS
TGGAYESYKFIPALEAAVKQAYAATVATAPEVKYTVFETALKKAIT
AMSEAQKAAKPAAAATATATAAVGAATGAATAATGGYKV

Phl p 5b (SEQ ID NO: 71)

MAVPRRGPRGGPGRSYTADAGYAPATPAAAGAAAGKATTEEQKLI
EDINVGFKAAVAARQRPAADKFKTFEAASPRHPRPLRQGAGLVPKL
DAAYSVAYKAAVGATPEAKFDSFVASLTEALRVIAGALEVHAVKP
VTEEPGMAKIPAGELQIIDKIDAAFKVAATAAATAPADDKFTVFEA
AFNKAIKESTGGAYDTYKCIPSLEAAVKQAYAATVAAAAEVKYAV
FEAALTKAITAMSEVQKVSQPATGAATVAAGAATTAAGAASGAAT
VAAGGYKV

Phl p 5a (SEQ ID NO: 72)

ESSSKAALTSKLDAAYKLAYKTAEGATPEAKYDAYVATLSEALRII
AGTLEVHAVKPAAEEVKVIPAGELQVIEKVDAAFKVAATAANAAP

ANDKFTVFEAAFNDEIKASTGGAYESYKFIPALEAAVKQAYAATVA
TAPEVKYTVFETALKKAITAMSEAQKAAKPPPLPPPPQPPPLAATGA
ATAATGGYKV

Phl p 5 (SEQ ID NO: 73)

MAVHQYTVALFLAVALVAGPAASYAADLGYGPATPAAPAAGYTP
ATPAAPAEAAPAGKATTEEQKLIEKINAGFKAALAAAAGVQPADK
YRTFVATFGAASNKAFAEGLSGEPKGAAESSSKAALTSKLDAAYKL
AYKTAEGATPEAKYDAYVATLSEALRIIAGTLEVHAVKPAAEEVKV
IPAGELQVIEKVDAAFKVAATAANAAPANDKFTVFEAAFNDAIKAS
TGGAYESYKFIPALEAAVKQAYAATVATAPEVKYTVFETALKKAIT
AMSEAQKAAKPAAAATATATAAVGAATGAATAATGGYKV

Phl p 6 (SEQ ID NO: 74)

MAAHKFMVAMFLAVAVVLGLATSPTAEGGKATTEEQKLIEDVNA
SFRAAMATTANVPPADKYKTFEAAFTVSSKRNLADAVSKAPQLVP
KLDEVYNAAYNAADHAAPEDKYEAFVLHFSEALRIIAGTPEVHAV
KPGA

Phl p 6 (SEQ ID NO: 75)

SKAPQLVPKLDEVYNAAYNAADHAAPEDKYEAFVLHFSEALHIIAG
TPEVHAVKPGA

Phl p 6 (SEQ ID NO: 76)

ADKYKTFEAAFTVSSKRNLADAVSKAPQLVPKLDEVYNAAYNAAD
HAAPEDKYEAFVLHFSEALHIIAGTPEVHAVKPGA

Phl p 6 (SEQ ID NO: 77)

TEEQKLIEDVNASFRAAMATTANVPPADKYKTLEAAFTVSSKRNLA
DAVSKAPQLVPKLDEVYNAAYNAADHAAPEDKYEAFVLHFSEALR
IIAGTPEVHAVKPGA

Phl p 6 (SEQ ID NO: 78)

MAAHKFMVAMFLAVAVVLGLATSPTAEGGKATTEEQKLIEDINAS
FRAAMATTANVPPADKYKTFEAAFTVSSKRNLADAVSKAPQLVPK
LDEVYNAAYNAADHAAPEDKYEAFVLHFSEALHIIAGTPEVHAVK
PGA

Phl p 6 (SEQ ID NO: 79)

MVAMFLAVAVVLGLATSPTAEGGKATTEEQKLIEDVNASFRAAMA
TTANVPPADKYKTFEAAFTVSSKRNLADAVSKAPQLVPKLDEVYN
AAYNAADHAAPEDKYEAFVLHFSEALRIIAGTPEVHAVKPGA

Phl p 7 (SEQ ID NO: 80)

MADDMERIFKRFDTNGDGKISLSELTDALRTLGSTSADEVQRMMA
EIDTDGDGFIDFNEFISFCNANPGLMKDVAKVF

Phl p 11 (SEQ ID NO: 81)

MSWQTYVDEHLMCEIEGHHLASAAILGHDGTVWAQSADFPQFKPE
EITGIMKDFDEPGHLAPTGMFVAGAKYMVIQGEPGRVIRGKKGAG
GITIKKTGQALVVGIYDEPMTPGQCNMVVERLGDYLVEQGM

Additional Phleum sequences (NCBI entrez accession):
458878, 548863; 2529314; 2529308; 2415702; 2415700; 2415698;

Wasp (and related)

Vespula sequences:

465054 ALLERGEN VES V 5 (SEQ ID NO: 82)

MEISGLVYLIIIVTIIDLPYGKANNYCKIKCLKGGVHTACKYGSLKPN
CGNKVVVSYGLTKQEKQDILKEHNDFRQKIARGLETRGNPGPQPPA
KNMKNLVWNDELAYVAQVWANQCQYGHDTCRDVAKYQVGQNV
ALTGSTAAKYDDPVKLVKMWEDEVKDYNPKKKFSGNDFLKTGHY
TQMVWANTKEVGCGSIKYIQEKWHKHYLVCNYGPSGNFMNEELY
QTK

1709545 ALLERGEN VES M 1 (SEQ ID NO: 83)

GPKCPFNSDTVSIIIETRENRNRDLYTLQTLQNHPEFKKKTITRPVVF
ITHGFTSSASEKNFINLAKALVDKDNYMVISIDWQTAACTNEYPGL
KYAYYPTAASNTRLVGQYIATITQKLVKDYKISMANIRLIGHSLGAH
VSGFAGKRVQELKLGKYSEIIGLDPARPSFDSNHCSERLCETDAEYV
QIIHTSNYLGTEKILGTVDFYMNNGKNNPGCGRFFSEVCSHTRAVIY
MAECIKHECCLIGIPRSKSSQPISRCTKQECVCVGLNAKKYPSRGSFY
VPVESTAPFCNNKGKII

1352699 ALLERGEN VES V 1 (SEQ ID NO: 84)

MEENMNLKYLLLFVYFVQVLNCCYGHGDPLSYELDRGPKCPFNSD
TVSIIIETRENRNRDLYTLQTLQNHPEFKKKTITRPVVFITHGFTSSAS
ETNFINLAKALVDKDNYMVISIDWQTAACTNEAAGLKYLYYPTAA
RNTRLVGQYIATITQKLVKHYKISMANIRLIGHSLGAHASGFAGKKV
QELKLGKYSEIIGLDPARPSFDSNHCSERLCETDAEYVQIIHTSNYLG
[illegible]
CCLIGIPKSKSSQPISSCTKQECVCVGLNAKKYPSRGSFYVPVESTAP
FCNNKGKII

1346323 ALLERGEN VES V 2 (SEQ ID NO: 85)

SERPKRVFNIYWNVPTFMCHQYDLYFDEVTNFNIKRNSKDDFQGD
KIAIFYDPGEFPALLSLKDGKYKKRNGGVPQEGNITIHLQKFIENLD
KIYPNRNFSGIGVIDFERWRPIFRQNWGNMKIHKNFSIDLVRNEHPT
WNKKMIELEASKRFEKYARFFMEETLKLAKKTRKQADWGYYGYP
YCFNMSPNNLVPECDVTAMHENDKMSWLFNNQNVLLPSVYVRQE
LTPDQRIGLVQGRVKEAVRISNNLKHSPKVLSYWWYVYQDETNTF
LTETDVKKTFQEIVINGGDGIIIWGSSSDVNSLSKCKRLQDYLLTVLG
PIAINVTEAVN

549194 ALLERGEN VES VI (SEQ ID NO: 86)

5KVNYCKIKCLKGGVHTACKYGTSTKPNCGKMVVKAYGLTEAEK
QEILKVHNDFRQKVAKGLETRGNPGPQPPAKNMNNLVWNDELANI
AQVWASQCNYGHDTCKDTEKYPVGQNIAKRSTTAALFDSPGKLVK
MWENEVKDFNPNIEWSKNNLKKTGHYTQMVWAKTKEIGCGSVKY
VKDEWYTHYLVCNYGPSGNFRNEKLYEKK

Additional vespula sequences (NCBI entrez accession):
549193; 549192; 549191; 549190; 549189; 117414; 126761; 69576; 625255; 627189; 627188; 627187; 482382; 112561; 627186; 627185; 1923233; 897645; 897647; 745570; 225764; 162551.

Tree allergen sequences (mainly birch) sequences:

114922 Bet v 1 (SEQ ID NO: 87)

MGVFNYETETTSVIPAARLFKAFILDGDNLFPKVAPQAISSVENIEG
NGGPGTIKKISFPEGFPFKYVKDRVDEVDHTNFKYNYSVIEGGPIGD
[illegible]
ETLLRAVESYLLAHSDAYN

130975 Bet v 2 (SEQ ID NO: 88)

MSWQTYVDEHLMCDIDGQASNSLASAIVGHDGSVWAQSSSFPQFK

PQEITGIMKDFEEPGHLAPTGLHLGGIKYMVIQGEAGAVIRGKKGSG

GITIKKTGQALVFGIYEEPVTPGQCNMVVERLGDYLIDQGL

1168696 Bet v 3 (SEQ ID NO: 89)

MPCSTEAMEKAGHGHASTPRKRSLSNSSFRLRSESLNTLRLRRIFDL

FDKNSDGHITVDELSRALNLLGLETDLSELESTVKSFTREGNIGLQFE

DFISLHQSLNDSYFAYGGEDEDDNEEDMRKSILSQEEADSFGGFKV

FDEDGDGYISARELQMVLGKLGFSEGSEIDRVEKMIVSVDSNRDGR

VDFFEFKDMMRSVLVRSS

809536 Bet v 4 (SEQ ID NO: 90)

MADDHPQDKAERERIFKRFDANGDGKISAAELGEALKTLGSITPDE

VKHMMAEIDTDGDGFISFQEFTDFGRANRGLLKDVAKIF

543675 Que a I (SEQ ID NO: 91)- Quercus alba=oak trees (fragment)

GVFTXESQETSVIAPAXLFKALFL

543509 Car b I (SEQ ID NO: 92)- Carpinus betulus=hornbeam trees (fragment)

GVFNYEAETPSVIPAARLFKSYVLDGDKLIPKVAPQAIXK

543491 Aln g I (SEQ ID NO: 93)- Alnus glutinosa=alder trees (fragment)

GVFNYEAETPSVIPAARLFKAFILDGDKLLPKVAPEAVSSVENI

1204056 Rubisco (SEQ ID NO: 94)

VQCMQVWPPLGLKKFETLSYLPPLSSEQLAKEVDYLLRKNLIPCLE

FELEHGFVYREHNRSPGYYDGRYWTMWKLPMFGCNDSSQVLKEL

EECKKAYPSAFIRIIGFDDK

Additional tree allergen sequences (NCBI entrez accession number):

131919; 128193; 585564; 1942360; 2554672; 2392209; 2414158; 1321728; 1321726; 1321724; 1321722; 1321720; 1321718; 1321716; 1321714; 1321712; 3015520; 2935416; 464576; 1705843; 1168701; 1168710; 1168709; 1168708; 1168707; 1168706; 1168705; 1168704; 1168703; 1168702; 1842188; 2564228; 2564226; 2564224; 2564222; 2564220; 2051993; 1813891; 1536889; 534910; 534900; 534898; 1340000; 1339998; 2149808; 66207; 2129477; 1076249; 1076247; 629480; 481805; 81443; 1361968; 1361967; 1361966; 1361965; 1361964; 1361963; 1361962; 1361961; 1361960; 1361959; 320546; 629483 ; 629482; 629481; 541804; 320545; 81444; 541814:; 629484; 474911; 452742; 1834387; 298737; 298736; 1584322; 1584321; 584320; 1542873; 1542871; 1542869; 1542867; 1542865; 1542863; 1542861; 1542859; 1542857; 1483232; 1483230; 1483228; 558561; 551640; 488605; 452746; 452744; 452740; 452738; 452736; 452734; 452732; 452730; 452728; 450885; 17938; 17927; 17925; 17921; 297538; 510951; 289331; 289329; 166953 .

Peanut

Peanut sequences

1168391 Ara h 1 (SEQ ID NO: 95)

MRGRVSPLMLLLGILVLASVSATHAKSSPYQKKTENPCAQRCLQSC
QQEPDDLKQKACESRCTKLEYDPRCVYDPRGHTGTTNQRSPPGER
TRGRQPGDYDDDRRQPRREEGGRWGPAGPRERERFEDWRQPRED
GRPSHQQPRKIRPEGREGHQEAGGIPGSHAREETSRNNPFYFPSRE
FSTRYGNQNGRIRVLQREDQRSRQFQNLQNHRIVQIEAKPNTLVLP
KHADADNILVIQQGQATVTVANGNNRKSFNLDEGHALRIPSGFISYI
LNRHDNQNLRVAKISMPVNTPGQFEDFFPASSRDQSSYLQGFSRNT

LEAAFNAEFNEIRRVLLEENAGGEQEERGQRRWSTRSSENNEGVIV
KVSKEHVEELTKHAKSVSKKGSEEEGDITNPINLREGEPDLSNNFGK
LFEVKPDKKNPQLQDLDMMLTCVEIKEGALMLPHFNSKAMVIVVV
NKGTGNLELVAVRKEQQQRGRREEEEDEDEEEEGSNREVRRYTAR
LKEGDVFIMPAAHPVAINASSELHLLGFGINAENNHRIFLAGDKDN
VIDQIEKQAKDLAFPGSGEQVEKLIKNQKESHFVSARPQSQSQSPSSP
EKESPEKEDQEEENQGGKGPLLSILKAFN

Ragweed

Ambrosia sequences

113478 Amb a 1 (SEQ ID NO: 96)
MGIKHCCYILYFTLALVTLLQPVRSAEDLQQILPSANETRSLTTCGT
YNIIDGCWRGKADWAENRKALADCAQGFAKGTIGGKDGDIYTVTS
ELDDDVANPKEGTLRFGAAQNRPLWIIFARDMVIRLDRELAINNDK
TIDGRGAKVEIINAGFAIYNVKNIIIHNIIMHDIVVNPGGLIKSHDGPP
VPRKGSDGDAIGISGGSQIWIDHCSLSKAVDGLIDAKHGSTHFTVSN
CLFTQHQYLLLFWDFDERGMLCTVAFNKFTDNVDQRMPNLRHGF
VQVVNNNYERWGSYALGGSAGPTILSQGNRFLASDIKKEVVGRYG
ESAMSESINWNWRSYMDVFENGAIFVPSGVDPVLTPEQNAGMIPAE
PGEAVLRLTSSAGVLSCQPGAPC

113479 Amb a 2 (SEQ ID NO: 97)
MGIKHCCYILYFTLALVTLVQAGRLGEEVDILPSPNDTRRSLQGCE
AHNIIDKCWRCKPDWAENRQALGNCAQGFGKATHGGKWGDIYM
VTSDQDDDVVNPKEGTLRFGATQDRPLWIIFQRDMIIYLQQEMVVT
[illegible]
NGGPAIPRHQSDGDAIHVTGSSDIWIDHCTLSKSFDGLVDVNWGST
GVTISNCKFTHHEKAVLLGASDTHFQDLKMHVTLAYNIFTNTVHE

RMPRCRFGFFQIVNNFYDRWDKYAIGGSSNPTILSQGNKFVAPDFIY
KKNVCLRTGAQEPEWMTWNWRTQNDVLENGAIFVASGSDPVLTA
EQNAGMMQAEPGDMVPQLTMNAGVLTCSPGAPC

113477 Amb a 1.3 (SEQ ID NO: 98)

MGIKQCCYILYFTLALVALLQPVRSAEGVGEILPSVNETRSLQACEA
LNIIDKCWRGKADWENNRQALADCAQGFAKGTYGGKWGDVYTV
TSNLDDDVANPKEGTLRFAAAQNRPLWIIFKNDMVINLNQELVVN
SDKTIDGRGVKVEIINGGLTLMNVKNIIIHNINIHDVKVLPGGMIKSN
DGPPILRQASDGDTINVAGSSQIWIDHCSLSKSFDGLVDVTLGSTHV
TISNCKFTQQSKAILLGADDTHVQDKGMLATVAFNMFTDNVDQR
MPRCRFGFFQVVNNNYDRWGTYAIGGSSAPTILCQGNRFLAPDDQI
KKNVLARTGTGAAESMAWNWRSDKDLLENGAIFVTSGSDPVLTPV
QSAGMIPAEPGEAAIKLTSSAGVFSCHPGAPC

113476 Amb a 1.2 (SEQ ID NO: 99)

MGIKHCCYILYFTLALVTLLQPVRSAEDVEEFLPSANETRRSLKACE
AHNIIDKCWRCKADWANNRQALADCAQGFAKGTYGGKHGDVYT
VTSDKDDDVANPKEGTLRFAAAQNRPLWIIFKRNMVIHLNQELVV
NSDKTIDGRGVKVNIVNAGLTLMNVKNIIIHNINIHDIKVCPGGMIKS
NDGPPILRQQSDGDAINVAGSSQIWIDHCSLSKASDGLLDITLGSSHV
TVSNCKFTQHQFVLLLGADDTHYQDKGMLATVAFNMFTDHVDQR
MPRCRFGFFQVVNNNYDRWGTYAIGGSSAPTILSQGNRFFAPDDIIK
KNVLARTGTGNAESMSWNWRTDRDLLENGAIFLPSGSDPVLTPEQ
KAGMIPAEPGEAVLRLTSSAGVLSCHQGAPC

NIIDGCWRGKADWAENRKALADCAQGFGKGTVGGKDGDIYTVTS
ELDDDVANPKEGTLRFGAAQNRPLWIIFERDMVIRLDKEMVVNSD

KTIDGRGAKVEIINAGFTLNGVKNVIIHNINMHDVKVNPGGLIKSND
GPAAPRAGSDGDAISISGSSQIWIDHCSLSKSVDGLVDAKLGTTRLT
VSNSLFTQHQFVLLFGAGDENIEDRGMLATVAFNTFTDNVDQRMP
RCRHGFFQVVNNNYDKWGSYAIGGSASPTILSQGNRFCAPDERSKK
NVLGRHGEAAAESMKWNWRTNKDVLENGAIFVASGVDPVLTPEQ
SAGMIPAEPGESALSLTSSAGVLSCQPGAPC

Cedar sequences

493634 Cry j IB precursor (SEQ ID NO: 101)

MDSPCLVALLVFSFVIGSCFSDNPIDSCWRGDSNWAQNRMKLADC
AVGFGSSTMGGKGGDLYTVTNSDDDPVNPPGTLRYGATRDRPLWI
IFSGNMNIKLKMPMYIAGYKTFDGRGAQVYIGNGGPCVFIKRVSNV
IIHGLYLYGCSTSVLGNVLINESFGVEPVHPQDGDALTLRTATNIWI
DHNSFSNSSDGLVDVTLTSTGVTISNNLFFNHHKVMSLGHDDAYSD
DKSMKVTVAFNQFGPNCGQRMPRARYGLVHVANNNYDPWTIYAI
GGSSNPTILSEGNSFTAPNESYKKQVTIRIGCKTSSSCSNWVWQSTQ
DVFYNGAYFVSSGKYEGGNIYTKKEAFNVENGNATPHLTQNAGVL
TCSLSKRC

493632 Cry j IA precursor (SEQ ID NO: 102)

MDSPCLVALLVLSFVIGSCFSDNPIDSCWRGDSNWAQNRMKLADC
AVGFGSSTMGGKGGDLYTVTNSDDDPVNPAPGTLRYGATRDRPL
WIIFSGNMNIKLKMPMYIAGYKTFDGRGAQVYIGNGGPCVFIKRVS
NVIIHGLHLYGCSTSVLGNVLINESFGVEPVHPQDGDALTLRTATNI
WIDHNSFSNSSDGLVDVTLSSTGVTISNNLFFNHHKVMLLGHDDAY
[illegible]
AIGGSSNPTILSEGNSFTAPNESYKKQVTIRIGCKTSSSCSNWVWQST
QDVFYNGAYFVSSGKYEGGNIYTKKEAFNVENGNATPQLTKNAGV
LTCSLSKRC

1076242 Cry j II precursor - Japanese cedar (SEQ ID NO: 103)

MAMKLIAPMAFLAMQLIIMAAAEDQSAQIMLDSVVEKYLRSNRSL
RKVEHSRHDAINIFNVEKYGAVGDGKHDCTEAFSTAWQAACKNPS
AMLLVPGSKKFVVNNLFFNGPCQPHFTFKVDGIIAAYQNPASWKN
NRIWLQFAKLTGFTLMGKGVIDGQGKQWWAGQCKWVNGREICND
RDRPTAIKFDFSTGLIIQGLKLMNSPEFHLVFGNCEGVKIIGISITAPR
DSPNTDGIDIFASKNFHLQKNTIGTGDDCVAIGTGSSNIVIEDLICGP
GHGISIGSLGRENSRAEVSYVHVNGAKFIDTQNGLRIKTWQGGSGM
ASHIIYENVEMINSENPILINQFYCTSASACQNQRSAVQIQDVTYKNI
RGTSATAAAIQLKCSDSMPCKDIKLSDISLKLTSGKIASCLNDNANG
YFSGHVIPACKNLSPSAKRKESKSHKHPKTVMVENMRAYDKGNRT
RILLGSRPPNCTNKCHGCSPCKAKLVIVHRIMPQEYYPQRWICSCHG
KIYHP

1076241 Cry j II protein - Japanese cedar (SEQ ID NO: 104)

MAMKFIAPMAFVAMQLIIMAAAEDQSAQIMLDSDIEQYLRSNRSLR
KVEHSRHDAINIFNVEKYGAVGDGKHDCTEAFSTAWQAACKKPSA
MLLVPGNKKFVVNNLFFNGPCQPHFTFKVDGIIAAYQNPASWKNN
RIWLQFAKLTGFTLMGKGVIDGQGKQWWAGQCKWVNGREICNDR
DRPTAIKFDFSTGLIIQGLKLMNSPEFHLVFGNCEGVKIIGISITAPRD
SPNTDGIDIFASKNFHLQKNTIGTGDDCVAIGTGSSNIVIEDLICGPG
HGISIGSLGRENSRAEVSYVHVNGAKFIDTQNGLRIKTWQGGSGMA
SHIIYENVEMINSENPILINQFYCTSASACQNQRSAVQIQDVTYKNIR
GTSATAAAIQLKCSDSMPCKDIKLSDISLKLTSGKIASCLNDNANGY
FSGHVIPACKNLSPSAKRKESKSHKHPKTVMVKNMGAYDKGNRTRI

541803 Cry j I precursor - Japanese cedar (SEQ ID NO: 105)

MDSPCLVALLVLSFVIGSCFSDNPIDSCWRGDSNWAQNRMKLADC
AVGFGSSTMGGKGGDLYTVTNSDDDPVNPPGTLRYGATRDRPLWI
IFSGNMNIKLKMPMYIAGYKTFDGRGAQVYIGNGGPCVFIKRVSNV
IIHGLHLYGCSTSVLGNVLINESFGVEPVHPQDGDALTLRTATNIWI
DHNSFSNSSDGLVDVTLSSTGVTISNNLFFNHHKVMLLGHDDAYSD
DKSMKVTVAFNQFGPNCGQRMPRARYGLVHVANNNYDPWTIYAI
GGSSNPTILSEGNSFTAPNESYKKQVTIRIGCKTSSSCSNWVWQSTQ
DVFYNGAYFVSSGKYEGGNIYTKKEAFNVENGNATPQLTKNAGVL
TCSLSKRC

541802 Cry j I precursor- Japanese cedar (SEQ ID NO: 106)
MDSPCLVALLVFSFVIGSCFSDNPIDSCWRGDSNWAQNRMKLADC
AVGFGSSTMGGKGGDLYTVTNSDDDPVNPAPGTLRYGATRDRPL
WIIFSGNMNIKLKMPMYIAGYKTFDGRGAQVYIGNGGPCVFIKRVS
NVIIHGLYLYGCSTSVLGNVLINESFGVEPVHPQDGDALTLRTATNI
WIDHNSFSNSSDGLVDVTLTSTGVTISNNLFFNHHKVMSLGHDDAY
SDDKSMKVTVAFNQFGPNCGQRMPRARYGLVHVANNNYDPWTIY
AIGGSSNPTILSEGNSFTAPNESYKKQVTIRIGCKTSSSCSNWVWQST
QDVFYNGAYFVSSGKYEGGNIYTKKEAFNVENGNATPHLTQNAGV

LTCSLSKRC

Dog

Canis sequences:

Can f 1 (SEQ ID NO: 107)

VPEKPDSVTPMILKAQKGGNLEAKTTMLTNGQCQNITVVTHKTSEP
GKYTAYEGQRVVFIQPSPVRDHYILYCEGELHGRQIRMAKLLGRDP
EQSQEALEDFREFSRAKGLNQEILTLAQSFTCSPGGQ

Serum albumin fragment (SEQ ID NO: 108)

EAYKSEIAHRYNDLGEEHFRGLVL

Serum albumin fragment (SEQ ID NO: 109)

LSSAKERFKCASLQKFGDRAFKAWSVARLSQRFPKADFAEISKVVT
DLTKVHKECCHGDLLECADDRADLAKYMCENQDSISTKLKECCDK
PVLEKSQCLAEVERDELPGDLPSLAADFVEDKEVCKNYQEAKDVF
LGTFLYEYSRRHPEYSVSLLLRLAKEYEATLEKCCATDDPPTCYAK
VLDEFKPLVDEPQNLVKTNCELFEKLGEYGFQNALLVRYTKKAPQ
VSTPTLVVEVSRKLGKVGTKCCKKPESERMSCADDFLS

Can f 2 (SEQ ID NO: 110)

MQLLLLTVGLALICGLQAQEGNHEEPQGGLEELSGRWHSVALASN
KSDLIKPWGHFRVFIHSMSAKDGNLHGDILIPQDGQCEKVSLTAFKT
ATSNKFDLEYWGHNDLYLAEVDPKSYLILYMINQYNDDTSLVAHL
MVRDLSRQQDFLPAFESVCEDIGLHKDQIVVLSDDDRCQGSRD

Additional dog allergen protein (NCBI entrez accession):

1731859

Horse

Equus sequences:

1575778 Equ c1 (SEQ ID NO: 111)

MKLLLLCLGLILVCAQQEENSDVAIRNFDISKISGEWYSIFLASDVK
EKIEENGSMRVFVDVIRALDNSSLYAEYQTKVNGECTEFPMVFDKT
[illegible]
[illegible]

3121755 Equ c 2 (SEQ ID NO: 112)

SQXPQSETDYSQLSGEWNTIYGAASNIXK

Euroglyphus (mite)

Euroglyphus sequences:

Eur m 1 (variant) (SEQ ID NO: 113)

TYACSINSVSLPSELDLRSLRTVTPIRMQGGCGSCWAFSGVASTESA
YLAYRNMSLDLAEQELVDCASQNGCHGDTIPRGIEYIQQNGVVQE
HYYPYVAREQSCHRPNAQRYGLKNYCQISPPDSNKIRQALTQTHTA
VAVIIGIKDLNAFRHYDGRTIMQHDNGYQPNYHAVNIVGYGNTQG
VDYWIVRNSWDTTWGDNGYGYFAANINL

Eur m 1 (variant) (SEQ ID NO: 114)

TYACSINSVSLPSELDLRSLRTVTPIRMQGGCGSCWAFSGVASTESA
YLAYRNMSLDLAEQELVDCASQNGCHGDTIPRGIEYIQQNGVVQE
HYYPYVAREQSCHRPNAQRYGLKNYCQISPPDSNKIRQALTQTHTA
VAVIIGIKDLNAFRHYDGRTIMQHDNGYQPNYHAVNIVGYGNTQG
VDYWIVRNSWDTTWGDNGYGYFAANINL

Eur m 1 (variant) (SEQ ID NO: 115)

ETNACSINGNAPAEIDLRQMRTVTPIRMQGGCGSCWAFSGVAATES
AYLAYRNQSLDLAEQELVDCASQHGCHGDTIPRGIEYIQHNGVVQE
SYYRYVAREQSCRRPNAQRFGISNYCQIYPPNANKIREALAQTHSAI
AVIIGIKDLDAFRHYDGRTIIQRDNGYQPNYHAVNIVGYSNAQGVD
YWIVRNSWDTNWGDNGYGYFAANIDL

[illegible] (SEQ ID NO: [illegible])

ETSAGRINSVNVPSELDLRSLRTVTPIRMQGGCGSCWAFSGVAATES

AYLAYRNTSLDLSEQELVDCASQHGCHGDTIPRGIEYIQQNGVVEE
RSYPYVAREQQCRRPNSQHYGISNYCQIYPPDVKQIREALTQTHTAI
AVIIGIKDLRAFQHYDGRTIIQHDNGYQPNYHAVNIVGYGSTQGVD
YWIVRNSWDTTWGDSGYGYFQAGNNL

Poa (grass) sequences

113562 POLLEN ALLERGEN POA P 9 (SEQ ID NO: (117)
MAVQKYTVALFLVALVVGPAASYAADLSYGAPATPAAPAAGYTP
AAPAGAAPKATTDEQKMIEKINVGFKAAVAAAGGVPAANKYKTFV
ATFGAASNKAFAEALSTEPKGAAVDSSKAALTSKLDAAYKLAYKS
AEGATPEAKYDDYVATLSEALRIIAGTLEVHGVKPAAEEVKATPAG
ELQVIDKVDAAFKVAATAANAAPANDKFTVFEAAFNDAIKASTGG
AYQSYKFIPALEAAVKQSYAATVATAPAVKYTVFETALKKAITAMS
QAQKAAKPAAAATGTATAAVGAATGAATAAAGGYKV

113561 POA P 9 (SEQ ID NO: 118)
MAVHQYTVALFLAVALVAGPAASYAADVGYGAPATLATPATPAA
PAAGYTPAAPAGAAPKATTDEQKLIEKINAGFKAAVAAAAGVPAV
DKYKTFVATFGTASNKAFAEALSTEPKGAAAASSNAVLTSKLDAA
YKLAYKSAEGATPEAKYDAYVATLSEALRIIAGTLEVHAVKPAGEE
VKAIPAGELQVIDKVDAAFKVAATAANAAPANDKFTVFEAAFNDA
IKASTGGAYQSYKFIPALEAAVKQSYAATVATAPAVKYTVFETALK
KAITAMSQAQKAAKPAAAVTATATGAVGAATGAVGAATGAATAA
AGGYKTGAATPTAGGYKV

113560 POA P 9 (SEQ ID NO: 119)
[illegible]
VGEAKKLDAFIQTSYLSTKAAEPKEKFDKFVESLKEVLRFMAGAVK
APPASKFPAKPAPKVAAYTPAAPAGAAPKATTDEQKLIEKINVGFK

AAVAAAAGVPAASKYKTFVATFGAASNKAFAEALSTEPKGAAVAS
SKAVLTSKLDAAYKLAYKSAEGATPEAKYDAYVATLSEALRIIAGT
LEVHGVKPAAEEVKAIPAGELQVIDKVDAAFKVAATAANAAPAND
KFTVFEAAFNDAIKASTGGAYQSYKFIPALEAAVKQSYAATVATAP
AVKYTVFETALKKAITAMSQAQKAAKPAAAVTGTATSAVGAATGA
ATAAAGGYKV

Cockroach sequences

2833325 Cr p1 (SEQ ID NO: 120)

MKTALVFAAVVAFVAARFPDHKDYKQLADKQFLAKQRDVLRLFH
RVHQHNILNDQVEVGIPMTSKQTSATTVPPSGEAVHGVLQEGHARP
RGEPFSVNYEKHREQAIMLYDLLYFANDYDTFYKTACWARDRVN
EGMFMYSFSIAVFHRDDMQGVMLPPPYEVYPYLFVDHDVIHMAQ
KYWMKNAGSGEHHSHVIPVNFTLRTQDHLLAYFTSDVNLNAFNTY
YRYYYPSWYNTTLYGHNIDRRGEQFYYTYKQIYARYFLERLSNDLP
DVYPFYYSKPVKSAYNPNLRYHNGEEMPVRPSNMYVTNFDLYYIA
DIKNYEKRVEDAIDFGYAFDEHMKPHSLYHDVHGMEYLADMIEG
NMDSPNFYFYGSIYHMYHSMIGHIVDPYHKMGLAPSLEHPETVLR
DPVFYQLWKRVDHLFQKYKNRLPRYTHDELAFEGVKVENVDVGK
LYTYFEQYDMSLDMAVYVNNVDQISNVDVQLAVRLNHKPFTYNIE
VSSDKAQDVYVAVFLGPKYDYLGREYDLNDRRHYFVEMDRFPYH
VGAGKTVIERNSHDSNHAPERDSYRTFYKKVQEAYEGKSQYYVDK
GHNYCGYPENLLIPKGKKGGQAYTFYVIVTPYVKQDEHDFEPYNY
KAFSYCGVGSERKYPDNKPLGYPFDRKIYSNDFYTPNMYFKDVIIF
HKKYDFVGVQGH

[redacted]

INEHHSHGLPPFVPPSRRHLARRGVGINGLIDDVLALLPVDELKALFQE
KLETSPDFKALYDAIRSPEFQSHSTLNAMQRSEHHQNLRDKGVDVD

HFIQLIRALFGLSRAARNLQDDLNDFLHSLEPISPRHRHGLPRQRRR
SARVSAYLHADDFHKHTTIEALPEFANFYNFLKEHGLDVVDYINEI
HSHGLPPFVPPSRRHARRGVGINGLIDDVIAILPVDELKALFQEKLET
SPDFKALYDAIRSPEFQSHSTLNAMPEYQELLQNLRDKGVDVDHFI
RVDQGTLRTLSSGQRNLQDDLNDFLALIPTDQILAIAMDYLANDAE
VQELVAYLQSDDFHKHTTIEALPEFANFYNFLKEHGLDVVDYINEI
HSHGLPPFVPPSQRHARRGVGINGLIDDVIAILPVDELKALFQEKLET
SPDFKALYDAIDLRSSRA

1703445 Bla g 2 (SEQ ID NO: 122)

MIGLKLVTVLFAVATITHAAELQRVPLYKLVHVFINTQYAGITKIGN
QNFLTVFDSTSCNVVVASQECVGGACVCPNLQKYEKLKPKYISDG
NVQVKFFDTGSAVGRGIEDSLTISNLTTSQQDIVLADELSQEVCILSA
DVVVGIAAPGCPNALKGKTVLENFVEENLIAPVFSIHHARFQDGEH
FGEIFGGSDWKYVDGEFTYVPLVGDDSWKFRLDGVKIGDTTVAPA
GTQAIIDTSKAIIVGPKAYVNPINEAIGCVVEKTTTRRICKLDCSKIPS
LPDVTFVINGRNFNISSQYYIQQNGNLCYSGFQPCGHSDHFFIGDFF
VDHYYSEFNWENKTMGFGRSVE
SV

1705483 Bla g 4 (SEQ ID NO: 123)

AVTALCATDTLANEDCFRHESLVPNLDYERFRGSWIIAAGTSEALT
QYKCWIDRFSYDDALVSKYTDSQGKNRTTIRGRTKFEGNKFTIDYN
DKGKAFSAPYSVLATDYENYAIVEGCPAAANGHVIYVQIRFSVRRF
HPKLGDKEMIQHYTLDQVNQHKKAIEEDLKHFNLKYEDLHSTCH

[illegible]

KTPVTFHDGKQTHQSVAISRYLGKQFGLSGKDDWTNLFIDMIVDTIS
DFRAAIANYHYDADENSKQKKWDPLKKETIPYYTKKFDEVVKANG

Applicants submit that a marked up version of the above amended pages is enclosed herewith.

Applicants further submit that, as required by 37 C.F.R. §1.821 (g), that the enclosed submission includes no new matter.

Respectfully submitted,

Date: 6/18/01

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Boston, MA 02108
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Marked-up Pages

Figure 7. The T cell proliferation responses observed in Figures 3, 4 and 6 are confirmed by [IL-5] measurement in Figures 7(a), 7(b) and 7(c) respectively. As expected, these results show that IL-5 production correlates with T-cell proliferation.

Figure 8. Hypothetical protein and peptides (15mers) derived from overlapping by one residue.

Figure 9. Multiple overlapping peptides (SEQ ID NOs: 6-18) (MOP) from the cat allergen Fel d I.

The three sequences within the box were insoluble in aqueous solution and as a result were excluded from the MOP preparation for clinical use.

Figure 10. An example of LAR induced by the Fel d I MOP. The intradermal administration of 13 peptides which comprise MOP (solid circles; 2.5 μg, day 1) induce a fall in FEV1 of greater than 20% at 3 hours. Control day administration of 30 BU cat dander extract does not induce a fall in FEV1 (open circles). A second administration of MOP (solid triangles; 2.5 μg, day 66) results in an attenuated fall in FEV1 which does not reach 20%. Arrows indicate the use of rescue medication (B2 agonists).

Figure 11. Changes in the cutaneous late phase response to whole allergen 6 hours after intradermal administratio`n of whole cat dander extract before and after intradermal administration of MOP.

Figures (a), (b) and (c) were administered intradermally to cat allergic asthmatic subjects inducing a fall in FEV1 of greater than 20% compared